

## CLAIMS

1. A laser processing apparatus for irradiating a wafer-like object to be processed with laser light while locating a light-converging point within the object so as to form a modified region by multiphoton absorption within the object, the apparatus comprising:

a beam expander for enlarging a beam size of the laser light emitted from a laser light source;

a condenser lens for converging the laser light incident thereon by way of the beam expander into the object; and

a lens holder holding the condenser lens and including a first light-transmitting hole for making the laser light incident on the condenser lens;

wherein a stop member having a second light-transmitting hole for narrowing and transmitting the laser light is disposed on an optical path of the laser light connecting the beam expander and the first light-transmitting hole to each other and is separated from the lens holder.

2. A laser processing apparatus according to claim 1, wherein, when the laser light emitted from the beam expander is substantially parallel light,

the second light-transmitting hole has a diameter not greater than that of the first light-transmitting hole.

3. A laser processing apparatus according to claim 1, wherein, when the laser light source emits the laser light at a beam diameter  $\phi_0$  and a divergence angle  $2\theta_0$ , and the beam expander enlarges the beam size of the laser light by a magnification  $M$  and emits the laser light at a divergence angle  $2\theta_1$ ;

assuming that  $d_1$  is the distance between an exit part of the laser light source and an entrance part of the beam expander,  $d_2$  is the distance between an exit part of the beam expander and an entrance opening of the second light-

transmitting hole, and  $d_3$  is the distance between the entrance opening of the second light-transmitting hole and an entrance opening of the first light-transmitting hole; and

5 letting  $\phi_L$  be the diameter of the first light-transmitting hole, and  $\phi_S$  be the diameter of the second light-transmitting hole;

$\phi_L$  and  $\phi_S$  satisfy the relationship of

$$\frac{\phi_L \{M(\phi_0 + 2d_1 \tan \theta_0) + 2d_2 \tan \theta_1\}}{M(\phi_0 + 2d_1 \tan \theta_0) + 2(d_2 + d_3) \tan \theta_1} \geq \phi_S.$$

4. A laser processing apparatus according to claim 1, wherein, when the laser light source emits the laser light at a beam diameter  $\phi_0$  and a divergence angle  $2\theta_0$ , and the beam expander enlarges the beam size of the laser light by a magnification  $M$  and emits the laser light at a convergence angle  $2\theta_1$ ;

10 assuming that  $d_1$  is the distance between an exit part of the laser light source and an entrance part of the beam expander,  $d_2$  is the distance between an exit part of the beam expander and an entrance opening of the second light-transmitting hole, and  $d_3$  is the distance between the entrance opening of the second light-transmitting hole and an entrance opening of the first light-transmitting hole; and

15 letting  $\phi_L$  be the diameter of the first light-transmitting hole, and  $\phi_S$  be the diameter of the second light-transmitting hole;

20  $\phi_L$  and  $\phi_S$  satisfy the relationship of

$$\frac{\phi_L \{M(\phi_0 + 2d_1 \tan \theta_0) - 2d_2 \tan \theta_1\}}{M(\phi_0 + 2d_1 \tan \theta_0) - 2(d_2 + d_3) \tan \theta_1} \geq \phi_S.$$